

### **REMARKS**

Claim 1 has been amended to clarify that the inorganic moulding is coated with a coating solution comprising at least one organic prepolymer or organic monomer and/or oligomer that is precipitated from the coating solution by lowering the temperature. Support for the amendment can be found, for example, in prior claim 25 and claim 6. In addition, claim 1 has been amended to clarify that the porosity is retained while the polymer creates a uniform layer on the pore surface. See, Example 1.5. No new matter has been added.

### **Rejections under 35 USC §112**

Claims 1-5, 12-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For purpose of clarity and in the interest of furthering prosecution, claim 1 has been amended to clarify that the inorganic moulding is coated.

Thus, it is respectfully requested that the rejection under 35 USC §112 be withdrawn.

### **Rejections under 35 USC §102/103**

A) Claims 1, 2, 4, 5, 14, 16, 17, 19, 21, 24 and 25 stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over EP 838 257. Claims 3, 15, and 18 stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over EP 838 257, and further in view of WO 98/58253. Claims 12 and 13 stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over EP 838 257, and further in view of Dhingra et al (US 6,054,052). Claim 20 stands rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over EP 838 257, and further in view of Li et al (US 7,125,488). Claims 22 and 23 stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over EP 838 257, and

further in view of Ohno et al (US 4,483,940). The rejections are respectfully traversed.

As discussed throughout the specification a moulding that is coated with a solution comprising at least one organic prepolymer or organic monomer and/or oligomer, which is precipitated from the coating solution by lowering the temperature, is not only very dense but is also stable against NaOH. The resulting moulding exhibits distinct differences from the prior art mouldings. For example, the inner surface of the moldings according to the present invention exhibits a very dense coating and as can be seen in Figs. 2 A and B. These scanning electron microscope pictures show there is no difference between the coated and uncoated mouldings with respect to morphology but as discussed in Example 1.5, the macropore structure is maintained and a dense uniform coating of pore surfaces is achieved. As disclosed in the specification (Example 2) at page 17, line 24 to page 18, line 16, for example, this dense coating is achieved by the introduction of the coating solution into the monolithic material by a decrease of temperature. The decrease of temperature induces a precipitation onto the moulding under suitable conditions. The details of this coating are described on pages 9 -11 of the present application. The dense precipitated coating exhibits exceptional stability against alkaline attack. See Example 1, for example, which compares the properties of a C-18 functionalized moulding with a polymer coated moulding according to the invention. Table 1, shows the remaining carbon content of the mouldings and their condition after treatment with sodium hydroxide solution for various times. As can be seen the C-18 functionalized mouldings lose a considerable amount of weight and thus also carbon modification in sodium hydroxide solution and are in some cases destroyed or even completely dissolved. By contrast, the polymer coated samples according to the invention which have a uniform coating on the pore surfaces exhibit good stability to the sodium hydroxide solution. Thus, there are significant unobvious differences between the claimed product and the prior art products.

Dell et al. (EP 838 257) teaches a membrane-coated substrate and method for forming the membrane coating on the substrate. In ' 257 a polymer membrane film is

applied to the inner surfaces of the moulding under pressure and in a softened state. The film is applied by hot pressing, tape casting, injection molding or extrusion. The resulting porous structure of the monolithic moulding doesn't remain. As can be seen at Col. 4, lines 43 - 54 of Dell, the fusion or joining of the film to the substrate inner channels is performed by softening the polymer film to render it in an adhesive state for bonding. The membrane material does not permeate into the inner mesopores (See column 4, line 56 - column 5, line 7). The membrane coating of Dell does not build a dense uniform layer on the inner pore surfaces of the mouldings.

In contrast to Dell, in the coated mouldings of the present invention the macropore structure is not blocked and a uniform coating of pore surfaces is achieved (see Figures 2a and 2b of the specification and Example 1.5), thereby preserving porosity.

Moreover, Dell does not teach or suggest a moulding having one side longer than the other(s) and having a cladding on the long side. Nor does Dell teach or suggest a moulding that is coated with a coating solution comprising at least one organic prepolymer or organic monomer and/or oligomer, which are precipitated from the coating solution by lowering the temperature. Dell is particularly silent regarding a coating that retains its porosity and is stable against NaOH.

Cabrerra et al (WO98/58253- equivalent to US 6,398,962) relates to monolithic sorbents used for preparative separation processes. In '962 porous materials are described which are modified by functional groups. These groups don't build a dense protective layer on the inner pore surfaces of the mouldings. The '962 reference does not disclose or suggest precipitating the coating solution by lowering the temperature. As discussed above, this results in a dense inner coating that is stable against alkaline solutions.

Thus, like Dell above, '962 does not teach or suggest a moulding having one side longer than the other(s) and having a cladding on the long side. Dell is also silent regarding an inorganic moulding that is coated with a coating solution comprising at

least one organic prepolymer or organic monomer and/or oligomer that is precipitated from the coating solution by lowering the temperature. As discussed above, such a coating would not block the macropore structure but would coat the inner pore surfaces and be stable against NaOH.

The secondary references do not cure the deficiencies of the primary references discussed above.

Ohno et al (US 4,483,940) teaches a ceramic honeycomb carrier of monolithic construction that is coated with 2-hydroxyethyl methacrylate. See column 4, lines 10-20. Like, Dell and Cabrera discussed above, Ohno is silent regarding a coating solution comprising at least one organic prepolymer or organic monomer and/or oligomer, that is precipitated from the coating solution by lowering the temperature which results in a distinct dense coating on the inner pore surfaces that is resistant to alkaline attack.

Dhingra et al (US 6,054,052) is relied upon for teaching a porous inorganic sorbent in the form of a flat membrane having a thickness 0.02 to 1000 microns.

Li et al (US 7,125,488) is relied upon for teaching a silica monolith having a surface modified with at least two silanes wherein one silane is an endcapping silane.

Dhingra and Li are both silent regarding a solution comprising at least one organic prepolymer or organic monomer and/or oligomer, which is precipitated from the coating solution by lowering the temperature.

**B)** Claims 1, 2, 4, 5, 12, 16-17, 19, and 21-25 stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Stanton et al (US 4,851,163). Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Stanton et al (US 4,851,163) as applied to claim 1, and further in view of Johnson (US 2002/0041041). The rejections are respectfully traversed.

Stanton (US 4,851,163) discloses a porous ceramic diffuser for wastewater treatment made from a porous ceramic body coated with a biocidal material to protect against fouling (column 2, lines 30-37). The biocidal material is sprayed or brushed on and chemically or physically bonded in a shallow layer extending inwardly from the exposed surface (column 2, lines 20-30). The porous ceramic body may be silica (column 3, lines 20-25). The coating may be a polymethacrylate (example 1).

As the Examiner correctly notes, Stanton does not specifically disclose the processing steps as set forth in the claims. In contrast to the present invention, after coating, the treated article of Stanton is heated to a temperature at which the biocidal copper oxide diffuses into the surface of the treated article. Thus, the treatment leads only to a diffusion of the material onto the surface grains resulting in a very thin layer on the exposed upper surface. On page 8 of the Office Action, the Examiner equates the shallow layer with the claimed cladding. This is not correct. The method of Stanton would not result in coating penetration deeply into the inner pores of the treated material. See, for example, the description of Figures 1 and 2 at column 3 lines 7 - 48. Figure 2 depicts a small region at the particle surface (the pore boundary 20). Additionally, column 4, lines 19 to 25, states:

"Organic biocidal ceramic composite bodies were also fabricated by spraying or brushing a mixture of organic polymer containing a biocidal component on the surface and then allowing the polymer to cure which chemically bonds or grafts the polymer coating to the surfaces of the grains in a manner similar to that shown with the copper coating. "

This, it is clear that Stanton only treats surfaces of the grains in order to achieve the antifouling effect. Stanton doesn't teach or suggest anything that would lead a skilled worker to introduce a polymer coating into the inner macro and meso pores of a porous body. The teaching of Stanton would lead to a body, which is covered at the outer surface by polymers but not to a body, whose inner pores are protected by a uniform polymer layer against NaOH attack. This is achieved because a solution containing at least one organic prepolymer or organic monomer and/or oligomer is introduced into the porous body and precipitated by lowering the temperature.

Johnson does not cure the deficiencies of Stanton. Johnson (US 2002/0041041) is relied upon for teaching a hollow monolithic ceramic diffuser having a length of from 50 to 762 mm and a width of from 6 to 90 mm.

All of the cited references are all silent with regards to an organic polymer coating that is physisorbed or chemisorbed on the inorganic moulding. They are particularly silent regarding precipitating the coating solution by lowering the temperature resulting in a dense coating on the inner pores. The resulting coating is not only very dense but is also stable against NaOH and exhibits distinct physical differences from the prior art mouldings (e.g., uniformly coated inner pores). Thus, it is respectfully requested that the rejections under 35 USC §102 and §103 be withdrawn.

No fee is believed to be due with this response, however, the Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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Attorney Docket No.: **Merck-3009**

Date: **9 September 2008**

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